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UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

PEAT-BOG FIRES - THEIR ORIGIN AND CONTROL

BY

D. J. PARKER, J. B. BENSON, F. E. CASH, AND J. H. BIRD

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

PEAT-BOG FIRES - THEIR ORIGIN AND CONTROL[1]

By D. J. Parker,[2] J. B. Benson,[3]
F. E. Cash,[4] and J. H. Bird[5]

INTRODUCTION

The organic act that became effective July 1, 1910, imposes two very definite primary obligations upon the Bureau of Mines: (1) The prevention of loss of life and limb and the protection of the health of workers in the mineral industries, and (2) the conservation and scientific utilization of the country's mineral resources.

The subject of this publication falls within the scope of both of these responsibilities by reason of the fact that (1) certain safety precautions are involved in combating even surface fires and, (2) although peat is not now, so far as known, utilized commercially or otherwise in this country as a fuel, it is extremely valuable agriculturally in at least one of our States. The justification for the conservation of such low-grade fuel through fire prevention appears warranted because of its present value to agriculture and the possible advantages accruing to future generations as a source of heat and power.

Although the Bureau of Mines has published information on the origin and uses of peat,[6] this is the first attempt to give out data concerning the prevention and control of peat-bog fires. Although the information presented here is restricted to the Lake Superior District, California, and Florida, there may be similar conditions in other sections of the country that have not come to the attention of engineers of the Bureau of Mines.

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[1] The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7411."

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[6] Davis, Charles A., The Uses of Peat for Fuel and Other Purposes: Bureau of Mines Bull. 16, 1911, 214 pp.
White, David and Thiessen, Reinhardt, The Origin of Coal: Bureau of Mines Bull. 38, 1913, 390 pp., with a chapter on Formation of Peat, by C. A. Davis.

Even though the demand for information on fires in peat bogs has been small, nevertheless this paper will serve a useful purpose in that it will afford an exchange of ideas with respect to procedure, equipment, and methods of controlling and extinguishing peat-bog fires on the part of those now engaged in such activities, as well as aiding those who may in the future be confronted with similar problems.

ACKNOWLEDGMENTS

The information contained in this publication was obtained through an inquiry initiated by D. Harrington, chief, Health and Safety Branch of the Bureau of Mines, and the authors obtained the data through contacts with engineers and State officials of Florida, the Lake Superior mining regions, and the State of California. Especially detailed information was obtained from the fire chief of the Everglades Fire-Control District of Florida.

DEFINITION OF PEAT[7]

According to Davis,[7] most of the difficulties experienced in utilizing peat as a fuel are due to the fact that in its natural state the material contains only about 10 percent of combustible matter, the remaining 90 percent (more or less) being chiefly water. Based upon the foregoing statement, the following definition appears logical:

Peat is partly decomposed and disintegrated vegetable matter that has accumulated in any place (usually in or under water) where the ordinary decay or chemical decomposition of such material has been more or less suspended, although the form and a considerable part of the structure of the plant organisms are more or less destroyed.

Water makes an excellent medium for preserving the remains of dead plants and, hence, also for aiding peat formation, as it excludes air and also most of the organisms that are the chief agents that cause wood and other plant structures to disintegrate and finally disappear. The water may contain certain poisonous organic chemical compounds that originated in the growing plants as the result of their activities or were formed as decomposition products. These compounds may act with water to prevent the growth of the organisms that cause decomposition, but the excess water appears to be paramount in the preservation of the vegetable matter.

The foregoing statement is so generally true that peat deposits within the limits of the United States nearly always are formed in places where, for the greater part of the year, water either saturates or wholly covers the plant debris from which peat originates. In those places where vegetable material is saturated with water for only part of the time and is subjected to periodical and prolonged drying out, true peat is not formed, but a more nearly complete decomposition takes place that finally results in the formation of humus; or, if the drying process is continued long enough and other conditions are favorable, decomposition may go on until essentially nothing is left of the plant material but the ash or mineral part.

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[7] See footnote 6.

DISTRIBUTION AND UTILIZATION OF PEAT[8]

Peat beds are not distributed uniformly over the United States but lie chiefly in the region north of a somewhat irregular line extending westward from close to the southern boundary of New York nearly to the ninetieth meridian and thence northward to Canada. This region is supplemented by a narrow strip of land that extends along the Atlantic coast to Florida, includes the whole of that State, and reaches westward, probably across Texas, to the Mexican border. In the Pacific Coast States there are some peat areas of workable size in California and also in the valleys of some of the lakes and rivers in Oregon and Washington, but little is known of the extent and character of the deposits.

Very little exact information is available as to the area and depth of peat deposits in the United States; therefore, an accurate estimate of the quantity available is impossible. On the assumption that there are in the United States, exclusive Alaska, 139,855 square miles of swamp land, it is estimated that about 8 percent of this area, or 11,188 square miles, contains peat deposits of good quality. Assuming, further, that the average depth of the peat in this area is at least 9 feet and that the average yield will be 200 tons of salable fuel per acre-foot, the available fuel in these deposits aggregates more than 12 billion tons.

During the 50 years prior to 1911, numerous attempts at peat manufacture were made in the United States. Large sums of money, aggregating many hundreds of thousands of dollars, were spent upon such ventures, yet virtually no financial returns were realized from them by their supporters. At one time or another over this 50-year period, at least 39 plants for the utilization of peat beds were placed in operation in 15 States, including California.

GEOLOGICAL HISTORY[9]

The region of Florida is rising, whereas there has been subsidence in the Chesapeake Bay area. Florida as well as other parts of North America have been alternately land and sea from the Cambrian period to the Permian period of the Paleozoic era. In the Upper Cretaceous, Florida, California, and the eastern part of the Lake Superior District were land. Finally, in the Tertiary period, (many millions of years later) the southern and eastern parts of Florida and most of the extreme western part of California were covered by the sea, whereas the Lake Superior district was land.

During the Pennsylvanian period of the Paleozoic era, great areas of the earth's surface were so flat and poorly drained that fresh-water swamps of tremendous size existed, especially upon the broad coastal plains that bordered the interior seas. The vegetation that fell into these swamps decayed so slowly under water that, year after year, there was a gradual accumulation of coal-forming plant material. Under the action of bacteria, the plant

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8/ Davis, Charles A., The Uses of Peat for Fuel and Other Purposes. Bureau of Mines Bull. 16, 1911, 214 pp.

9/ Hussey, Russell C., Historical Geology, Associate Professor of Geology, University of Michigan, The Geologic History of North America: McGraw-Hill Book Co., Inc., New York and London, 1944.

tissues were broken down, oxygen and hydrogen were released, and peat was eventually produced. The process might have stopped here, but in those areas where the coal swamps were later covered with thick deposits of sedimentary rock the heat and great pressure generated by this heavy load of sediments eventually converted the peat into lignite, and finally into bituminous coal.

In view of the foregoing, it would appear that the absence of such deposits of sedimentary strata, together with the time, climatic, and other factors, probably explains why our present deposits of peat have not been changed into lignite.

PEAT-BOG FIRES IN THE LAKE SUPERIOR DISTRICT

Because of average or above-average rainfall during the past 6 or 7 years in this district, there have been only a few peat-bog fires, none of them serious.

Representatives of the United States Forest Service, Duluth, Minn., submitted the following pertinent information concerning the extinguishment or attempted extinguishment of a number of serious peat-bog fires in 1935 and 1936, following three or four dry years in succession:

Methods of combating such fires thus far have been expensive and, depending on the depth of the peat bog, it sometimes requires considerable time to extinguish or isolate even a small fire. If the bog is shallow, 2 to 10 feet, as in Minnesota, the procedure that has proven successful is to lay a pipe line around the fire area; then, by the use of one or more nozzles, slowly saturate the bog with water from the surface to the bottom, closing into and finally extinguishing the fire at the center of the affected area. The nozzle usually consists of a piece of 3/4-inch pipe about 5 feet long, to one end of which a hose is connected. The opposite end of the pipe is closed. One-eighth-inch holes are so drilled in the semicircumference of the pipe that, when held waist high it will wet or saturate an area about 5 feet square. Water is obtained from the most convenient and adequate source and is pumped into the lines by means of a portable fire pump.

If the peat bog beds range in thickness from 12 to 100 feet, as some of them do in Michigan and Wisconsin, the nozzle method of combat is ineffective. Fires occurring in such beds have been extinguished by two methods: (1) By throwing up a levee or dam around the fire area and pumping water behind the dam, thereby eventually obtaining saturation and extinguishment; (2) a second method is to channel or ditch around the fire area to the bottom of the bed and keep the channel filled with water until the fire has been extinguished a sufficient distance toward the center of the fire area to warrant the removal of the water from the channel. Following such removal, radial channels are driven toward the center of the affected area until hot material is encountered, whereupon the channels are again filled with water, this procedure being repeated until the fire is extinguished.

PEAT-BOG FIRES IN CALIFORNIA

This information is based upon personal inspection by one of the authors of the areas where peat-bog fires are most prevalent and, in addition the matter was discussed with several officials of the California State Division of Highways, whose helpful cooperation is acknowledged.

Most of the peat land in these areas lies west and northwest of Stockton in San Joaquin and Solano Counties and in a small section of Sacramento County lying in the low lands of the Sacramento and San Joaquin Rivers. Most of the recent peat-bog fires have occurred in State Highway District 10.

The depth of the peat deposit ranges from zero near Stockton to approximately 60 feet in the vicinity of Rio Vista. The water level is said to be approximately 15 feet below the surface of the peat throughout the area.

Following discussions with a number of local maintenance foremen and after visiting the areas, it was concluded that the peat fires with which the California Highway Division is concerned have probably been caused by material thrown from vehicles; however, a number of fires were started by a pyromaniac. Because in one section a railroad parallels the highway, one official expressed the belief that the locomotives may have been responsible for the many fires that have occurred in that region in recent years. This opinion was not supported by others, and such a possibility appears remote in view of the fact that the locomotives in question are exclusively oil burners. The farmers throughout the area are conscious of the fire hazard and therefore seldom fire dry grass; when they do, proper controls are used almost invariably.

The Division of Highways does not maintain a regular fire patrol. Local farmers or other interested persons are expected to report fires. This Division receives good cooperation from the farmers, railroad companies, and county highway departments in fire-prevention and fire-fighting work.

State and county highway departments maintain portable centrifugal suction pumps, and in at least one instance four such pumps were dispatched to extinguish a fire. The unit (consisting of a pump and engine) inspected by one of the authors is mounted on a 2-wheel trailer that could be coupled to most of their pick-up trucks. The pump, with a 4-inch-diameter outlet, is equipped with a reducer and approximately 40 feet of 3-inch-diameter heavy-duty rubber hose and a 2-inch-diameter nozzle. The capacity of the pump is about 250 gallons per minute, and the head developed is about 100 feet, or approximately 45 pounds per square-inch pressure; it is direct-connected to a 3-1/4- by 4-inch gasoline engine.

The extent of the peat fires in that area is difficult to detect; often the only indication on the surface is a small patch of white or red ash and, if it has burrowed to 2 or 3 feet below the surface, there is likely to be virtually no smoke. Fires have often burned below the water level, because the peat forms good insulation, with the result that the material is dried ahead of combustion.

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An ample supply of water usually can be found in the ditches and sloughs and is utilized for pumping in order to hydraulic the earth until the seat of the fire is reached. Unless the fire is entirely exposed or spread, complete saturation is not attained, and the fire is not likely to be extinguished. Several of the officials expressed an opinion that extinguishment could be expedited if they were supplied with pumps that could develop higher pressure than those now in use. The experience has been that drenching the surface with a low-pressure stream will not suffice, as the water does not readily penetrate the peat; it may be that the use of a suitable wetting agent in the water might be of material aid.

Most of the fires with which the Division of Highways is concerned occur along the shoulders of the highways, where the embankments lend well to the hydraulic mining away of the earth. Generally, the fire fighters have been able to reach the fires by the hydraulic method with a minimum amount of shoveling.

In one case that occurred on a farm a number of years ago, a trench was excavated tangent to the fire, after which one side was dug away by shovelers while streams of water were played on the wall. Through progressive application of this method the fire was exposed and extinguished. In another case, a peat fire on a farm in the low land got out of control, and the landowner released water from a nearby canal to completely inundate this field. It remains inundated at the present time. These two cases occurred some distance from the road and were not, at least at that time, the concern of the Division of Highways.

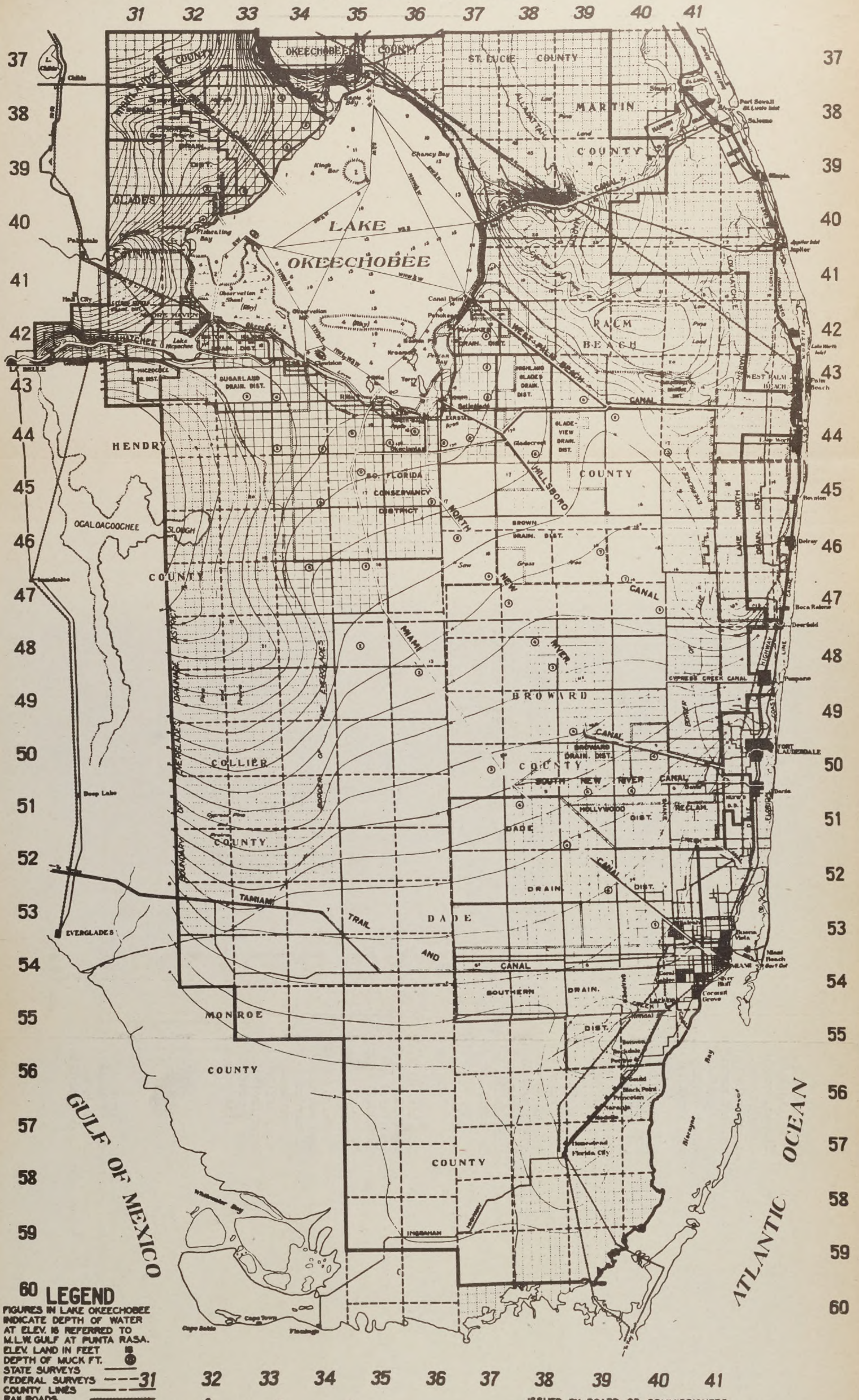
A definite plan for the control or prevention of peat fires has not been adopted by the Highway Division, but one section of highway approximately 8 miles long holds the interest of the officials, in that numerous fires occurred there years ago; but since the roadbed was rebuilt (about 1942) with incombustible material (sand and gravel) there have been no fires.

It is understood that the sand-gravel fill was used in that area because a fill constructed of local soil was unstable. A control method was discovered in that construction somewhat by accident; some of the foremen pointed out other short sections of roadbed composed of either clay or sand and gravel, and as a result of utilizing such construction they are no longer afflicted with peat fires. It is interesting to note that vegetation grows profusely along the shoulders where sand or clay has been used, and, although such vegetation often burns, the protective coating of incombustible material prevents the fire from penetrating to the peat.

Although it is not the conclusion of the entire Department, at least two officials are convinced that sand and gravel fills or possibly even a 6- to 8-inch covering of sand over the shoulders of the roads would virtually eliminate difficulties with peat fires.

Following inspection of the sections of highway where peat fires have occurred frequently, it was found, that the shoulders are composed of local or native soil. As might be expected, a heavy growth of grass and weeds was rooted in peat along the shoulders. In the area where peat fires appear to

MAP OF
EVERGLADES DRAINAGE DISTRICT
OF FLORIDA



LEGEND

FIGURES IN LAKE OKEECHOBEE INDICATE DEPTH OF WATER AT ELEV. 18 REFERRED TO M.L.W. GULF AT PUNTA RASA.

ELEV. LAND IN FEET 18
DEPTH OF MUCK FT. ⑧
STATE SURVEYS
FEDERAL SURVEYS ---31
COUNTY LINES
RAILROADS
ROADS
LOCKS
LEVEES
CANALS CONSTRUCTED OR UNDER CONSTRUCTION
BOUNDARY OF SUBDRAINAGE DISTRICTS
CONTOURS

8 0 8
Scale, miles

This Map Shows Area of
Everglades Fire Control District

ISSUED BY BOARD OF COMMISSIONERS
OF THE EVERGLADES DRAINAGE DISTRICT.
MIAMI, FLORIDA, 1935

U. S. Soil Conservation Service
C. Kay Davis, Project Manager

have been checked, the fill averages 4 feet of sand and gravel at the center line, the sand extending an average of 20 feet on a gradual slope on each side from the edges of the asphalt surface.

In an effort to control vegetation along highways, some experimentation is under way in which a cheap, low-grade borax compound from California mines is being spread along the shoulders; however, there are no conclusions as to its effectiveness. Some time ago a weed burner was used on trial in the peatland area, but it proved impractical as it required a large follow-up fire-fighting crew to extinguish the fire or prevent its spreading to the peat.

Throughout the vulnerable section, occasional warning signs have been posted near the shoulders of highways. They are about 4 feet by 5 feet with a white background and large red and black lettering reading: "Warning - Peat Land Will Burn--Smokers Take Caution."

PEAT-BOG FIRES IN FLORIDA

General Information

The area for which special fire protection is afforded by the State authorities is comprised of 11 counties (all or part) in the extreme southern end of Florida and covers 5,200,000 acres, nearly all of which lies within the Everglades. Of this area, approximately 3,000,000 acres is comprised of peat bogs, locally referred to as muck soil. Toward the northern end of the area is Lake Okeechobee, the extreme width and length of which are 30 and 36 miles, respectively. Its relation to the reclamation of the area will be discussed later.

Muck-Soil Characteristics

The depth of the muck soil varies considerably throughout the area, ranging from as little as 6 inches to 14 feet. The soil is black, highly fertile, and combustible. One unfamiliar with the district is prone to associate the Everglades with water-logged, tangled, undrained, impassible swamps. Such conception is true only in part, because, as a result of an extensive system of drainage canals discharging into both the Gulf of Mexico and the Atlantic Ocean many thousands of acres of the area have been reclaimed converted into valuable farming lands. The accompanying topographical map[10] gives some pertinent information concerning such drainage system. Sugar cane and vegetables are the principal year-around crops; as evidence of the fertility of the muck soil, there is a daily harvest of 10,000 tons of sugar cane and of large quantities of a variety of vegetables.

Topography of the Area

The topographical map indicates that the area is virtually level, the elevation above sea level ranging from zero to 45 feet, with a probable average of about 12 feet. Circled figures on the map are the depths of the muck soil, and uncircled figures are elevations above sea level. The normal elevation of the surface of Lake Okeechobee is only 16 feet above sea level, and the lake is quite shallow, as indicated by figures in the lake, the maximum depth being only 15 feet, which establishes the elevation of the bed of the lake at the greatest depth as 1 foot above sea level.

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[10] Davis, C. K., Map of Everglades Drainage District: U. S. Soil Conservation Service. Issued by Board of Commissioners of the Everglades Drainage District, Miami, Fla., 1935.

Because of the slight difference in altitude (2 to 4 feet) between the normal surface of Lake Okeechobee and the adjacent terrain, a levee composed largely of muck soil was erected several years ago around the shore line of the south half of the lake. Later, a terrific hurricane destroyed this levee to such an extent that much of the adjoining reclaimed land was inundated, with the loss of many lives. Subsequently, the United States Government rebuilt the levee with broken stone at a cost of $17,000,000. The total length of the levee is approximately 60 miles. Suitable locks are provided where drainage canals pass through. Without such levee and drainage-canal system, reclamation of many thousands of acres of valuable farm lands would have been impossible.

Everglades Fire-Control District

Because of numerous destructive muck-soil fires and the absence of regulations to control starting of fires that would ultimately ignite the muck soil (or ground), the State of Florida established the Everglades Fire Control District. Eight fire stations are strategically located in the District, one of them at Belle Glade. Guy J. Bender, with headquarters at Belle Glade, is fire chief with supervision over the eight stations. Competent crews are maintained at each station and are subject to call 24 hours per day.

Fire permits are now required by law before outdoor fires can be started. Such permits are issued by Fire Chief Guy J. Bender and only to responsible persons. It is the special duty of this department to control and extinguish fires that occur throughout the area.

Major Causes of Fires

Prior to passage of a State law closing the hunting season on alligators, the Indians were accustomed to burning off the high grass (5 to 6 feet in height) over considerable area in order to facilitate location of alligator dens, these reptiles being hunted for their hides. This was responsible for numerous muck-soil fires. However, since establishment of the fire-permit system and closing of the alligator-hunting season, fires from this cause have been virtually eliminated.

Burning off fields of dry grass, etc., carelessness on the part of smokers, and small fires kindled by farm hands on cool mornings before starting work have been prolific sources of muck-soil fires, and in all probability there are some fires of incendiary origin. Lightning is also a possible source of fire.

Controlled burning is employed on a large scale in harvesting vast acreages of sugar cane. With the cane still standing, the dry fodder is burned off without injury to the cane. Because of special supervision and necessary precautions ignition of the muck soil is prevented; if the muck soil should be ignited, immediate steps are taken to extinguish the fire.

Fire-Fighting Procedure

During the past 11 years, the Everglades Fire Control District has experienced a considerable number of fires in the muck-soil area. After considerable experimentation, it has been found that the only practical way to extinguish fires is to impound and flood the burning area; or, if the area is not too large, the fire is extinguished with high-pressure pumps using a solid stream, that is, pumps that deliver water under 200 pounds pressure per square inch through 2-1/2-inch hose with conventional nozzle. It has also been found that the muck soil contains much oxygen, and in order to extinguish a fire it is necessary to start at the edge of the burning area with a high-pressure hose and wash it right down to the water table. In other words, it is necessary to start what the firemen call "knifing it" from the edge across. It has been found that by simply wetting from the top down for 12 or 14 inches there is sufficient oxygen underneath to support combustion, and the muck soil continues to burn, and in a day or so the fire will break out again.

The muck soil burns with a smoldering fire and not only will penetrate the soil on the level but will "eat" its way into levee banks and highway and railroad fills composed of this material.

Water delivered as fog has been found to be relatively effective in the extinguishment of muck-soil fires. It is understood that 1 gallon of water applied as fog will do the work of about 30 gallons of water delivered as a solid stream through a conventional-type nozzle. The water is converted into fog through a special nozzle attached by hose to a centrifugal pump delivering 250 gallons of water per minute at 800 pounds pressure per square inch. It appears that the use of some types of wetting agents might be of material aid in this procedure.

Another important phase of the Everglades Fire Control District is the establishment of firebreaks. When grass or brush fires get out of control, it becomes necessary to isolate the affected area as far as possible. The initial step is to use a large-turn plow pulled by a caterpillar tractor. When the break is of adequate width, a disk plow similarly pulled is run over the plowed ground.

Fire-Fighting Equipment

The principal fire-fighting equipment of the Belle Glade station consists of five self-propelled motor trucks equipped with water tanks with a capacity of 500 to 750 gallons, 180 feet of 3/4-inch high-pressure hose, 200 feet of 2-1/2-inch hose, centrifugal pumps operated by truck engine, a muck buggy carrying 750 gallons of water and mounted on bomber tires (1,700 by 16) and pulled by caterpillar tractor. The muck buggy is equipped with a centrifugal pump operated by a gasoline engine. One jeep is attached to a 250-gallon-tank trailer, and the jeep is equipped with a centrifugal pump. There is also one caterpillar tractor, one turn plow (No. 41), and one disk plow; the caterpillar tractor and plows are transported on trucks. All equipment is painted red and maintained in first-class condition.

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All self-propelled motor vehicles are provided with two-way radios on the same wave length as that on highway patrol cars. One of the trucks carries a high-pressure (800 pounds per square inch) centrifugal pump for operation of the fog nozzle.

An important accessory is a compact portable lighting unit operated by a gasoline engine. This unit generates current at 110 volts and has a capacity sufficient to operate five 100-watt lights simultaneously. It is used during nocturnal fire-fighting operations and also for the protection of such equipment and the safety of traffic when fighting fires in the immediate vicinity of highways at night or during heavy fogs.

When it becomes necessary to run a hose line over a highway, this is accomplished without interrupting traffic by using a "jumper" consiting of a piece of 2-1/2-inch steel pipe about 9 feet long with standard hose connections on each end. To this pipe are welded, at their centers, two pieces of sheet steel; they are so bent that their ends and the lower surface of the pipe form a straight line, and consequently they lie evenly on the highway. The two pieces of sheet steel cover all but about a 24-inch middle section of the pipe and are approximately 24 inches wide.

The motor vehicles are converted Army equipment, and their adaptation to present needs is due to the ingenuity and skill of Guy J. Bender, chief, Everglades Fire Control District, and his associates; the work was done in the District shop at Belle Glade.

Miscellaneous equipment for the most part is comprised of tools, jacks, spare parts, etc., including strainers for attaching to suction hose when it becomes necessary to pump from canals or other available sources of water supply. It is understood that the equipment at the Belle Glade station is duplicated at the other seven stations.

Recapitulation of All Fires

Tables 1 and 2 give pertinent information concerning the work of the Everglades Fire Control District for the 5 fiscal years 1941-1942 to 1945-1946, inclusive.

It will be noted from table 1 that the eight fire-control stations handled 2,987 fires during the 5-year period. The total number of acres involved was 501,367, total man-hours worked was 38,191, and total number of fire permits issued, 4,600. Data are given concerning controlled burning and firebreaks, also.

Table 2, in addition to duplicating data in table 1, breaks down the acreage involved with respect to ownership. Although Government land was involved to the extent of 2,804 acres, no funds were received from the Federal Government for fire-control purposes. The Everglades Fire Control District is financed by the State.

The data set forth in tables 1 and 2 are of special significance, in that they indicate not only the necessity for such an organization but emphasize the splendid service the personnel of the eight stations is rendering to various and sundry land owners.

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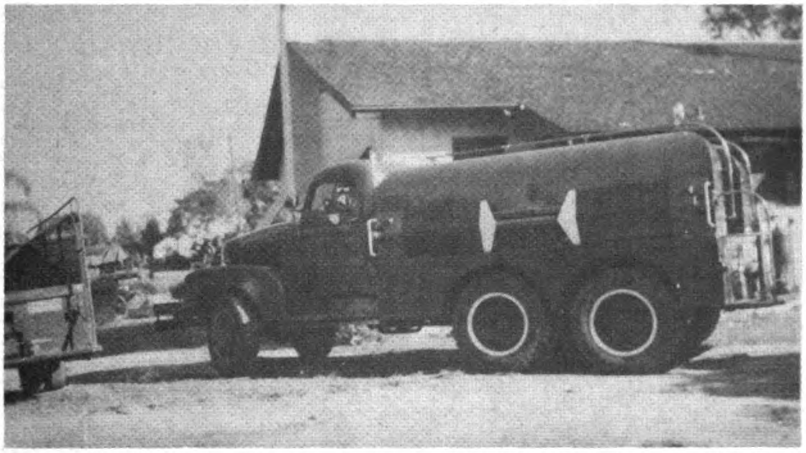
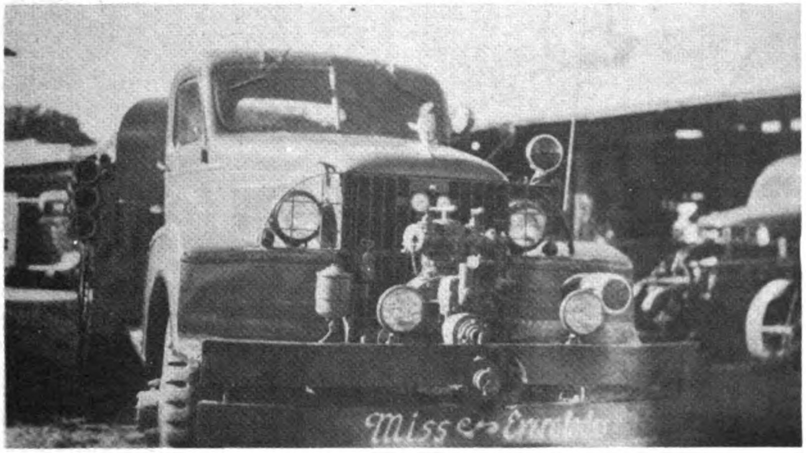
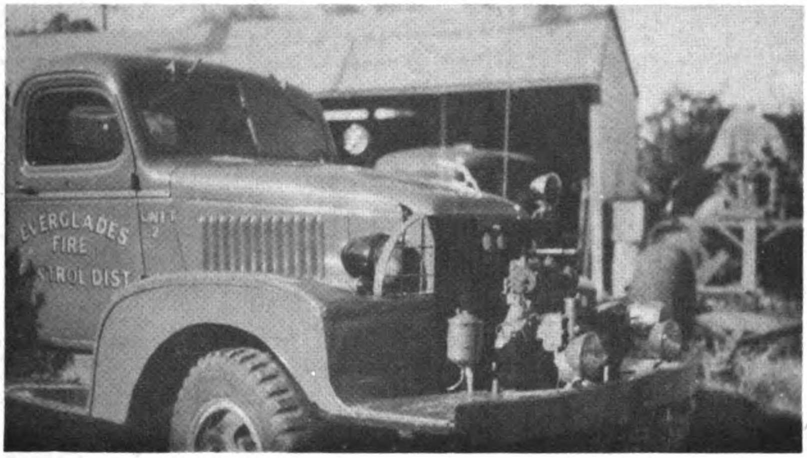


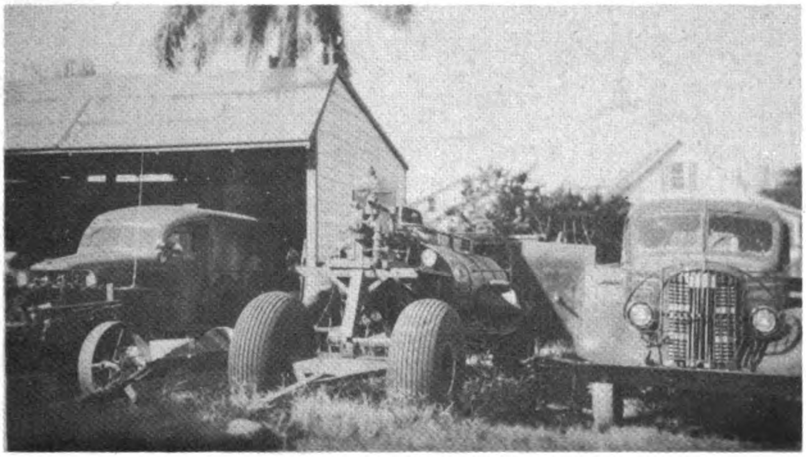
Fire truck, double duel wheels in rear. Note "jumper" mounted on side of water tank.



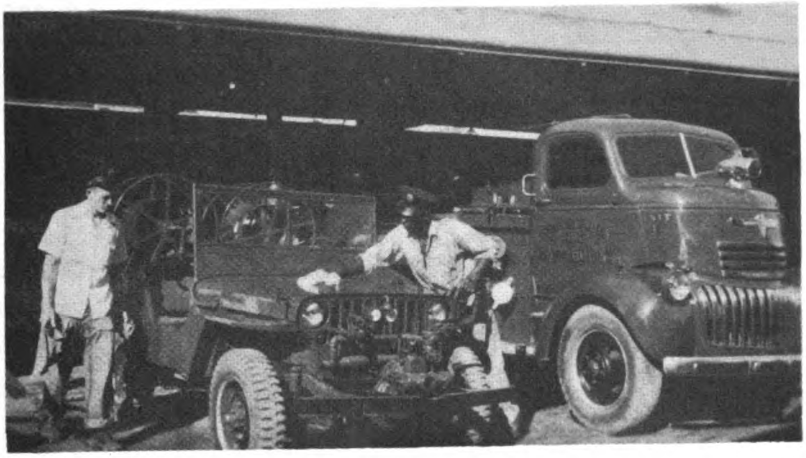
View of centrifugal pump mounted on front end of ("Miss Everglades") fire truck.



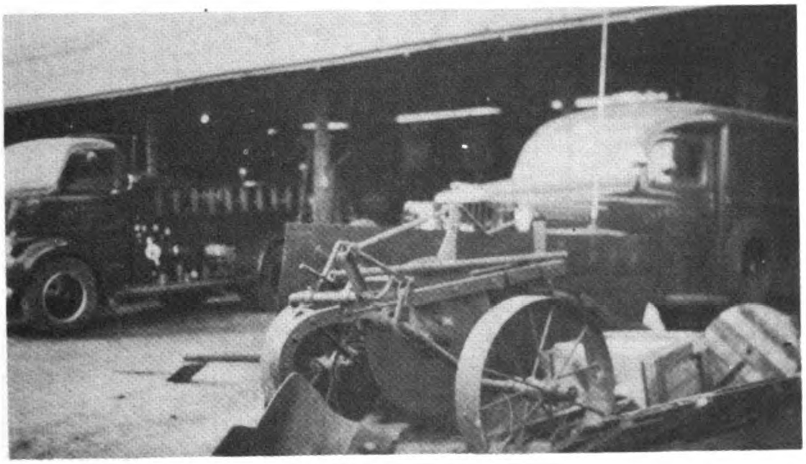
Front of fire truck, Unit 2, with centrifugal pump protected by bumper. Shop in background.



Muck buggy in center. Note centrifugal pump mounted on front end and bomber tires. Shop at left.



Jeep at left and fire truck, Unit 15, at right. Centrifugal pump mounted on front of jeep.



Large turnplow (No. 41), two fire trucks, and shop in background.

TABLE 1. - Recapitulation of all fires, Everglades Fire-Control District, 1941-1946, inclusive

	1941-1942	1942-1943	1943-1944	1944-1945	1945-1946
Total fires	300	691	638	741	617
Total acres	28,998	116,032	91,836	196,293	68,208
Total man hours	1,841	15,363	5,286	9,231	6,470
Total fire permits..	1,415	975	777	575	858
Controlled burning..	120 hours, 5,760 acres			72 hours 24,819 acres	20 miles fire break

TABLE 2. - Recapitulation of all fires, Everglades Fire-Control District, 1941-1946, inclusive

	1941-1942	1942-1943	1943-1944	1944-1945	1945-1946
Total fires	300	691	638	741	617
Total acres	1,023, private ownership; 27,410, State and unknown ownership; 565, Government ownership	37,964, private ownership; 74,777, State and unknown ownership; 1,286, Government ownership; 5, County ownership; 2,000, fire breaks	20,762, private ownership; 70,484, State and unknown ownership; 445, Government ownership; 125, County ownership; 20, city ownership	45,796, private ownership; 149,989, State and unknown ownership; 508, Government ownership	4,756, private ownership; 62,315, State and unknown ownership; 1,060, railroad ownership; 77, city ownership;
Total acres	28,998	116,032	91,836	196,293	68,208
Total man hours....	1,841	15,363	5,286	9,231	6,470
Total fire permits..	1,415	975	777	575	858
Controlled burning..	120 hours	5,760 acres		72 hours 24,819 acres	20 miles fire break

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CONCLUSIONS

Information now available indicates that Florida is the only State in the Union maintaining permanently established, well-organized, suitably equipped, and properly manned fire-fighting stations, the sole purpose of which is to prevent and control peat-bog or muck-soil fires.

In vulnerable areas where there is a likelihood of peat or muck-soil ignitions, it would appear desirable that a system of issuing fire permits comparable to that now in use in Florida be instituted. This system, together with supervision and education, should accomplish much with respect to fire prevention in those States now lacking suitable precautionary regulations.

The origin of fires in California, Florida, Michigan, Minnesota, and Wisconsin is probably similar, smoking perhaps being commonest. Burning off fields of dry grass and kindling outdoor fires for comfort are also prolific causes of ignition of peat or muck soil. The activities of the pyromaniac should not be overlooked, and, although perhaps a remote possibility, lightning may be a source of ignition.

The method of combating such fires in these States is not dissimilar, except that little or no ditching is done in Florida; and the method of applying the water is fundamentally the same, except that water applied under high pressure as a fog, as practiced in Florida, appears to be unusually effective. This method might well be given consideration in other States and the use of suitable types of wetting agents with the water or fog probably would prove useful.

As the country becomes more thickly populated, and with a corresponding increase in the number of motor vehicles, the careless occupants of which continue to discard burning smoking materials indiscriminately along the highways and to make camp fires, etc., it is believed that it will become advantageous for other States to follow the example of Florida and California in the establishment of permanent fire-fighting organizations to control peat or muck-soil fires.